REMARKS

In the Office Action[1], the Examiner took the following actions:

> rejected claims 2, 14, 21, and 22 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Publication No. 2002/0084513 ("Siniaguine") in view of U.S. Publication No. 2002/0115226 A1 (that matured to U.S. Patent No. 6,963,095, on November 8, 2005, "Mikawa");
>
> rejected claims 5 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine and Mikawa in view of U.S. Publication No. 2002/0190375 A1 (that matured to U.S. Patent No. 6,699,787, on March 2, 2004, "Mashino");
>
> rejected claims 4, 6, 7, 9, 13, 15, 23, and 24 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Publication No. 2003/0210534 ("Swan") in view of Mikawa and further in view of Mashino;
>
> rejected claims 10 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Swan, Mikawa, and Mashino and further in view of U.S. Publication No. 2001/045605 ("Mayashita");
>
> rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine and Mikawa in view of Mayashita;
>
> rejected claim 17 under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine, Mikawa, in view of U.S. Patent No. 6,166,425 ("Sakao"); and
>
> rejected claims 16, and 18-20 under 35 U.S.C. § 103(a) as being unpatentable over Swan, Mikawa, and Mashino, and further in view of Sakao.

Applicant cancels claim 21, amends claims 2, 4, 6, 9, and 20, and adds new claim 25. Claims 1 and 3 were previously cancelled. Thus, claims 2, 4-20, and 22-24 remain pending and under current examination.

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[1] The Office Action contains a number of statements reflecting characterizations of the related art and the claims. Regardless of whether any such statement is identified herein, Applicant declines to automatically subscribe to any statement or characterization in the Office Action.

Rejection of claims 2, 14, 21, and 22 U.S.C. § 103(a)

The Examiner rejected claims 2, 14, 21, and 22 under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine in view of Mikawa. A *prima facie* case of obviousness has not been established because the Examiner has not articulated a reason why the applied references would render obvious the claims.

The key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. Such an analysis should be made explicit and cannot be premised upon mere conclusory statements. *See M.P.E.P. § 2142, 8th Ed., Rev. 6 (Sept. 2007).* "A conclusion of obviousness requires that the reference(s) relied upon be enabling in that it put the public in possession of the claimed invention." *M.P.E.P. § 2145.* Furthermore, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art" at the time the invention was made. *M.P.E.P. §2143.01(III)*, internal citation omitted. In addition, when "determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious." *M.P.E.P. § 2141.02(I)*, internal citations omitted (emphasis in original).

For example, Siniaguine does not teach or suggest "a through plug formed to have a side surface being in contact with one of the diffusion layer patterns, the side surface being surrounded by the one of the diffusion layer patterns without being in

contact with the insulation film," (emphasis added) as recited in independent claim 2. Siniaguine teaches that "[o]ne or more openings 124 are formed in the top surface of substrate 110" (emphasis added, paragraph 0013), "[d]ielectric layer 140 ... is formed on the semiconductor surface I opening 124" (emphasis added, paragraph 0014), "[c]onductive layer 150 is formed in openings 124 on dielectric 140" (emphasis added, paragraph 0016), and "[a] filler 160 ... is formed optionally in openings 124" (paragraph 0018). Siniaguine teaches that the side surface of the conductive layer 150 is in contact with the substrate. Siniaguine is silent on the two-dimensional plane arrangement in which "a through plug formed to have a side surface being in contact with one of the diffusion layer patterns, the side surface being surrounded by the one of the diffusion layer patterns without being in contact with the insulation film," (emphasis added) as recited in independent claim 2.

Moreover, Siniaguine does not teach or suggest "a through plug formed to have a side surface being in contact with one of the diffusion layer patterns, the side surface . . . to pass through the one of the diffusion layer patterns and the semiconductor substrate[,]" as recited in claim 2. Instead, Siniaguine teaches that the conductive layer 150 is formed to pass through only the substrate 110 (Fig. 5).

Mikawa fails to cure the deficiencies of Siniaguine. Mikawa shows a plurality of plugs that rest on top of diffusion layers. The side surfaces of the plugs are not in contact with those diffusion layer patterns. Therefore, Mikawa also fails to teach or suggest "a through plug formed to have a side surface being in contact with one of the diffusion layer patterns, the side surface being surrounded by the one of the diffusion

layer patterns without being in contact with the insulation film," as recited in independent claim 2.

Since the differences between the prior art and the invention recited in claim 2 have not been addressed, no reason has been articulated why one of ordinary skill in the art would find the invention of claim 2 obvious. Therefore, a *prima facie* case of obviousness has not been established. Independent claim 2 is therefore allowable. Claims 14 and 22 are allowable at least due to their dependence from base claim 2. Applicant cancels claim 21, rendering its rejection moot. Applicant therefore requests reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection of claims 2, 14, 21, and 22.

Rejection of claims 5 and 8 U.S.C. § 103(a)

The Examiner rejected claims 5 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine and Mikawa, further in view of Mashino. Dependent claims 5 and 8 depend from claim 2, and thus incorporate each and every element of independent claim 2. As discussed above, Siniaguine and Mikawa fail to teach or suggest the elements recited in claim 2 and required by claims 5 and 8. Mashino fails to cure the deficiencies of Siniaguine and Mikawa. That is, Mashino is silent with respect to the existence of a plug, and therefore does not disclose at least "a through plug formed to have a side surface being in contact with one of the diffusion layer patterns, the side surface being surrounded by the one of the diffusion layer patterns without being in contact with the insulation film," as required by claims 5 and 8.

Since these differences between the prior art and the inventions of claims 5 and 8 have not been addressed, no reason has been articulated why one of ordinary skill in the art would find the inventions of claims 5 and 8 obvious. Therefore, a *prima facie* case of the obviousness of claims 5 and 8 has not been established over Siniaguine, Mikawa, and Mashino. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claims 5 and 8.

Rejection of claims 4, 6, 7, 9, 13, 15, 23, and 24 U.S.C. § 103(a)

The Examiner rejected claims 4, 6, 7, 9, 13, 15, 23, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Swan in view of Mikawa, and further in view of Mashino. A *prima facie* case of obviousness has not been established because the Examiner has not articulated a reason why the applied references would render obvious the claims.

For example, Swan fails to teach "a through plug formed to have a side surface being in contact with the insulation film, the side surface being surrounded by the insulation film without being in contact with the diffusion layer patterns[,] " (emphasis added) as recited in claim 7, and similarly recited in claim 9. Swan, instead, discloses an opening 44 (figure 3) that "extends all the way through the die 10" (paragraph 0024, lines 4-5). The opening 44 is then "filled with a portion 64 of the conductive member 60" (paragraph 0025, lines 1-2). Swan is silent on the two-dimensional plane arrangement and does not disclose "a through plug formed to have a side surface being in contact with the insulation film, the side surface being surrounded by the insulation film without

being in contact with the diffusion layer patterns[,] " (emphasis added) as recited in claim 7, and similarly recited in claim 9.

Mikawa fails to cure the deficiencies of Swan. Mikawa does not show a "a through plug formed to have a side surface being in contact with the insulation film, the side surface being surrounded by the insulation film without being in contact with the diffusion layer patterns[,] " (emphasis added) as recited in claim 7, and similarly recited in claim 9. Instead, Mikawa shows a through plug formed with a side surface that is not in contact with the insulation film.

Mashino is silent on "a through plug formed to have a side surface being in contact with the insulation film, the side surface being surrounded by the insulation film without being in contact with the diffusion layer patterns[,] " (emphasis added) as recited in claim 7, and similarly recited in claim 9. Therefore, the Examiner's citations to Mikawa and Mashino do not cure the deficiencies of Swan.

As another example, Swan does not teach or suggest "an insulation film formed between the diffusion layer patterns on the semiconductor substrate to isolate the diffusion layer patterns from one another[,]" with "a through plug formed to have a side surface being in contact with the insulation film[,]" (emphasis added) as recited in claim 7, and similarly recited in claim 9. Swan, instead, discloses alternating dielectric layers (figure 5, element 32) formed over the semiconductor substrate (figure 5, element 12), while the diffusion layers (element 24) are formed on the substrate. The alternating dielectric layers separate metallization layers (element 34) from one another, but do not "isolate the diffusion layer patterns from one another[,]" with "a through plug formed to

have a side surface being in contact with the insulation film[,]" as recited in claim 7, and similarly recited in claim 9.

Mikawa fails to cure the deficiencies of Swan. Mikawa does not show a "an insulation film formed between the diffusion layer patterns on the semiconductor substrate to isolate the diffusion layer patterns from one another[,]" with "a through plug formed to have a side surface being in contact with the insulation film[,]" (emphasis added) as recited in claim 7, and similarly recited in claim 9. Instead, Mikawa shows a through plug formed with a side surface that is not in contact with the insulation film. Further, one of ordinary skill in the art would not have predictably combined Mikawa with Swan because Swan teaches away from Mikawa's invention. For example, Swan teaches away from etching of an opening in a die (paragraph 0005, lines 3-6). Mikawa, however, teaches etching an opening in a die (paragraphs 0026 and 0028).

Mashino is silent on "an insulation film formed between the diffusion layer patterns on the semiconductor substrate to isolate the diffusion layer patterns from one another[,]" with "a through plug formed to have a side surface being in contact with the insulation film[,]" as recited in claim 7, and similarly recited in claim 9. Therefore, the Examiner's citations to Mikawa and Mashino do not cure the deficiencies of Swan, and the combination of Swan, Mikawa, and Mashino fail to render claims 7 and 9 obvious. Accordingly, claims 7 and 9 are allowable.

Dependent claims 4, 13, and 23, and 6, 15, and 24 depend from base claims 7 and 9, respectively, and should be allowable at least due to their dependence. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claims 4, 6, 7, 9, 13, 15, 23, and 24.

Rejection of claims 10 and 12 U.S.C. § 103(a)

The Examiner rejected claims 10 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Swan, Mikawa, and Mashino, and further in view of Mayashita. Dependent claims 10 and 12 depend from claims 7 and 9, and thus incorporate each and every element of independent claims 7 and 9. As discussed above, Swan, Mikawa, and Mashino fail to teach or suggest the elements recited in claims 7 and 9 and required by claims 10 and 12. Mayashita fails to cure the deficiencies of Swan, Mikawa, and Mashino. That is, Mayashita is silent on "an insulation film formed between the diffusion layer patterns on the semiconductor substrate to isolate the diffusion layer patterns from one another[,]" with "a through plug formed to have a side surface being in contact with the insulation film[,]" as required by dependent claims 10 and 12. Therefore, Mayashita also fails to teach or suggest the elements recited in claims 7 and 9 and required by claims 10 and 12.

In view of the failure to address the differences between the prior art and the inventions of claims 10 and 12, no reason has been articulated why one of ordinary skill in the art would find the inventions of claims 10 and 12 obvious. Therefore, a *prima facie* case of the obviousness of claims 10 and 12 has not been established over Swan, Mikawa, Mashino, and Mayashita. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claims 10 and 12.

Rejection of claim 11 U.S.C. § 103(a)

The Examiner rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine, Mikawa, in view of Mayashita. Dependent claim 11 depends from claim 2, and thus incorporates each and every element of independent claim 2. As discussed above, Siniaguine and Mikawa fail to teach or suggest the elements recited in claim 2 and required by claim 11. Mayashita fails to cure the deficiencies of Siniaguine and Mikawa. That is, Mayashita is silent with respect to the existence of a plug, and therefore does not disclose at least "a through plug formed to have a side surface being in contact with one of the diffusion layer patterns, the side surface being surrounded by the one of the diffusion layer patterns without being in contact with the insulation film," as required by dependent claim 11. Therefore, Mayashita also fails to teach or suggest the elements recited in claim 2 and required by claim 11.

In view of the failure to address the differences between the prior art and the invention of claim 11, no reason has been articulated why one of ordinary skill in the art would find the invention of claim 11 obvious. Therefore, a *prima facie* case of the obviousness of claim 11 has not been established over Siniaguine, Mikawa, and Mayashita. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claim 11.

Rejection of claim 17 U.S.C. § 103(a)

The Examiner rejected claim 17 under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine, Mikawa, in view of Sakao. Dependent claim 17 depends from claim 2, and thus incorporates each and every element of independent claim 2. As discussed

above, Siniaguine and Mikawa fail to teach or suggest the elements recited in claim 2 and required by claim 17. Sakao fails to cure the deficiencies of Siniaguine and Mikawa. That is, Sakao does not disclose at least "a through plug formed to have a side surface being in contact with one of the diffusion layer patterns, the side surface being surrounded by the one of the diffusion layer patterns without being in contact with the insulation film," as required by dependent claim 17. Instead, Sakao discloses a plug that is in contact with extraction pads (figure 3A, element 122aa). The plug is not in contact with diffusion layers (element 124). Therefore, Mayashita also fails to teach or suggest the elements recited in claim 2 and required by claim 17.

In view of the failure to address the differences between the prior art and the invention of claim 17, no reason has been articulated why one of ordinary skill in the art would find the invention of claim 17 obvious. Therefore, a *prima facie* case of the obviousness of claim 17 has not been established over Siniaguine, Mikawa, and Sakao. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claim 17.

Rejection of claims 16, and 18-20 U.S.C. § 103(a)

The Examiner rejected claims 16, and 18-20 under 35 U.S.C. § 103(a) as being unpatentable over Swan, Mikawa, and Mashino, and further in view of Sakao. Dependent claims 16 and 19, and 18 and 20 depend from base claims 7 and 9, respectively, and thus incorporate each and every element of claims 7 and 9. As discussed above, Swan, Mikawa, and Mashino fail to teach or suggest the elements recited in claims 7 and 9 and required by claims 16, and 18-20.

Sakao fails to cure the deficiencies of Swan, Mikawa, and Mashino. That is, Sakao does not disclose "an insulation film formed between the diffusion layer patterns on the semiconductor substrate to isolate the diffusion layer patterns from one another[,]" with "a through plug formed to have a side surface being in contact with the insulation film[,]" as required by claims 16, and 18-20. Sakao discloses plugs that are in contact with insulating film 141 (figure 3A), however, the insulating film 141 is not formed between diffusion layers 124ab. In other words, the insulating film 141 that is in contact with a plug is not "formed between the diffusion layer patterns on the semiconductor substrate to isolate the diffusion layer patterns from one another[,]" as required by claims 16, and 18-20. Therefore, Sakao also fails to teach or suggest the elements recited in claims 7 and 9 and required by claims 16, and 18-20.

In view of the failure to address the differences between the prior art and the inventions of claims 16, and 18-20, no reason has been articulated why one of ordinary skill in the art would find the inventions of claims 16, and 18-20 obvious. Therefore, a *prima facie* case of the obviousness of claims 16, and 18-20 has not been established over Swan, Mikawa, Mashino, and Sakao. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claims 16, and 18-20.

Conclusion

In view of the foregoing amendments and remarks, claims 2, 4-20, and 22-24 are allowable. New claim 25 depends from allowable base claim 7, and should therefore be allowable at least due to its dependence. Applicant respectfully requests

reconsideration and reexamination of this application and the timely allowance of claims 2, 4-20, and 22-25.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: October 31, 2007

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